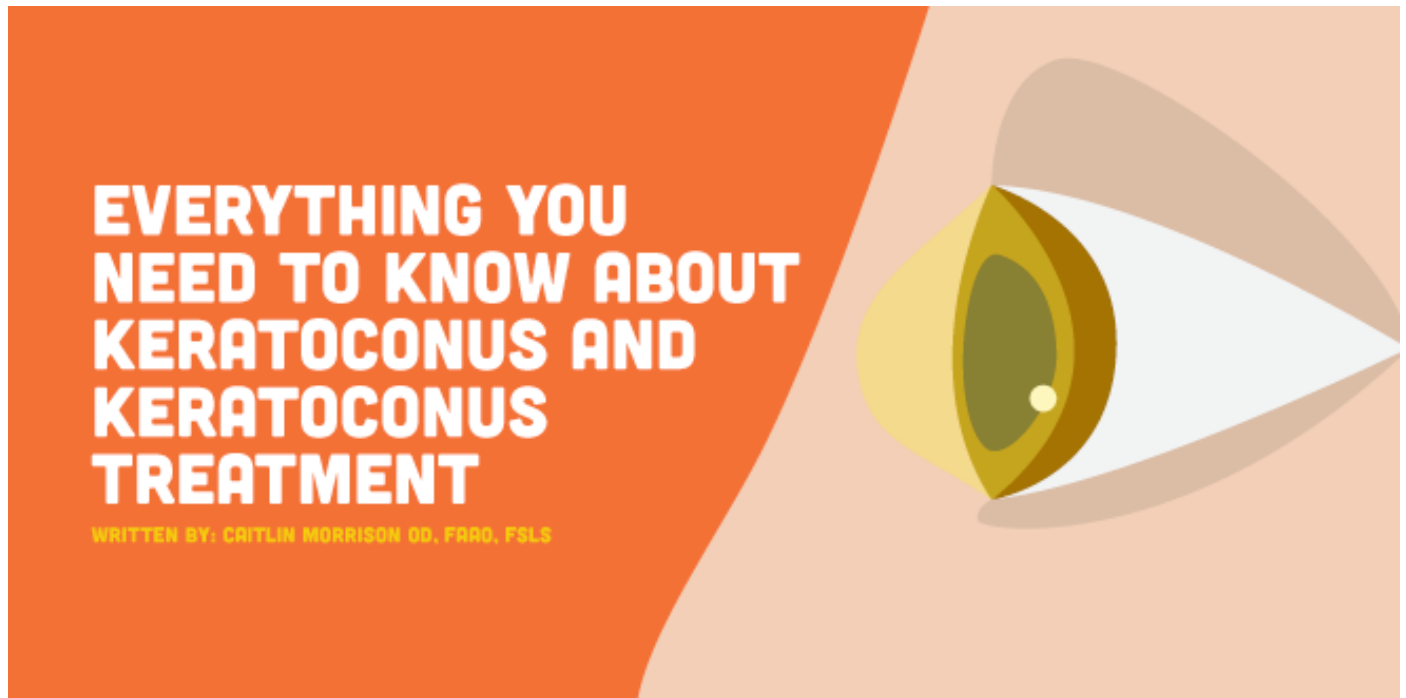


Keratoconus Treatment – Everything You Need to Know



Keratoconus (KCN) is a biomechanical instability in corneal tissue causing bilateral asymmetrical progressive thinning and subsequent ectasia of the cornea.¹ In this article, I will highlight the causes and symptoms of KCN, as well as keratoconus treatment.

Why Does Keratoconus Occur?

The collagen in keratoconic corneas either is initially normal and degrades over time, or begins as abnormally synthesized tissue.¹

Lysosomal and proteolytic enzymes responsible for corneal thinning and collagen lamellae configuration are increased in these patients and protease inhibitors are reduced. Although there is no definitive cause of keratoconus, there have been links to development of KCN through genetics, mechanical damage from constant eye rubbing, or both.

How Many People Have Keratoconus?

On average, about 1/2000 people have keratoconus.^{2,3}

Onset of KCN generally occurs during puberty, stabilizes in the 30s, with progression being less common over age 40.⁴ If one eye has KCN, there is a 50% chance of the other eye progressing to having keratoconus within 16 years.⁵

What Are The Signs?

Classic Signs⁶

- Scissoring reflex on retinoscopy
- Increasing amounts of astigmatism
 - Those with >2.0 Diopters of astigmatism have a 14% chance of having KCN or subclinical keratoconus²
- Visual acuity not correctable to 20/20 with glasses⁶
- Distorted mires on keratometry
- Asymmetrical bow tie astigmatism on topography

Tips For Earlier Diagnosis:

For an earlier diagnosis of keratoconus, specifically sub-clinical or “forme fruste” keratoconus, a tomographer is a device that uses scanning technology to give data about the posterior surface of the cornea and corneal thickness.

The following numbers can give clinicians an idea of whether or not a patient may be developing keratoconus.⁶

Posterior Elevation Map:

- Elevation points are marked as either above (+) or below (-) the “best fit sphere”: a representation of a normal posterior cornea.
- Patients that have points of + 26.5 microns or higher above the best fit

sphere have a 97% sensitivity and 81% specificity for a diagnosis of sub-clinical keratoconus.^{2,3}

Corneal Thickness Map:

- Minimum corneal thickness of less than or equal to 497.5 microns is the second most accurate predictor of a sub-clinical keratoconus diagnosis.

Keratoconus Treatment and Management

1) Corneal Crosslinking

Description: Corneal crosslinking halts progression of keratoconus by strengthening the cornea by hardening the covalent connections between corneal collagen fibrils in the stroma.^{4,7}

Technique: Riboflavin (Vitamin B2) drops are applied to the cornea for about 30 minutes, followed by 30 minutes of irradiance with Ultraviolet-A (UV-A) light.⁸

- Riboflavin is a molecule that photosensitizes the stroma and protects the corneal endothelium, crystalline lens, and retina from damage from UV-A light.
- The corneal epithelium is either removed prior to the procedure (epi-off) or left alone (epi-on).

Who is a Candidate?

- A patient who has been diagnosed with KCN and who you feel is at risk of progression.
- A patient having post-LASIK ectasia who, by diagnosis, has already shown progression.

Who is Not a Candidate? Those who have:⁹

1. Corneal thickness below 400 microns.
 - *Lack of thickness of the cornea may result in UV-A light damage to the endothelial cells.*

1. Prior herpetic infection or concurrent infection
 - UV-A light and epithelial/stromal damage may activate latent infections.

1. Severe corneal scarring, which may worsen after the procedure
2. History of poor epithelial wound healing
3. Severe ocular surface disease
4. Autoimmune disease
5. Pregnancy

Benefits of Crosslinking

1. Stabilization of progression
2. Reduction of ectasia
 - 54% flattening effect of the cornea¹⁰
 - Reduction in astigmatism and improvement in best-corrected visual acuity⁷

2) Contact Lenses

Contact lenses, specifically gas permeable contact lenses, provide a great option for clearer vision for those with this condition because the tear film between the rigid contact lens and the cornea masks irregularities on the anterior corneal surface.

3) Corneal Transplants (Penetrating Keratoplasty)

Who is a good candidate?⁸

- Those with corneal scarring that is interfering with the visual axis.
- Those for whom contact lenses are intolerable or are unable to handle

daily lens insertion and removal

Who is a poor candidate?¹²

1. Those who can achieve a good visual acuity with glasses or contact lenses
2. Those with extensive corneal neovascularization.
 - Neovascular vessels introduce immune cells into the cornea, increasing the likelihood of rejection of the corneal transplant. Aggressive immunosuppression may be needed if a transplant is warranted.

4) Intacs

Intacs are intracorneal ring segments (ICRS) made of a plastic material called PMMA (polymethyl methacrylate), that are placed in the corneal stroma at about 75% depth (~400 microns).^{13,14}

The goal of Intac segment placement is to normalize and flatten the corneal surface, reducing irregular astigmatism and improving visual acuity with glasses or contact lenses. The improvement in corneal shape may result in better contact lens tolerance.

Good candidates

Those with central corneal thickness greater than or equal to 400 microns, peripheral corneal thickness around 450 microns, and no corneal scarring.

How does it work?

Intac segments do not halt the progression of keratoconus; however, they do have potential to “normalize” the cornea by redistributing the collagen lamellae in the cornea. The lamellae move towards the peripheral intact segments (steepening) and subsequently flatten the central cornea.

With the advent of new technology for an earlier diagnosis and the advancements of surgical techniques; hopefully, we as practitioners can skillfully and effectively manage our keratoconus patients.

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